Optimize native mini-meadow germination for biodiversity CURE

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Why mini-meadows?

- Habitat and food source for pollinators
- Supports local wild live
- Small scale re-wilding
- Low effort lawn alternative
- Flowers through the season if well planned
- Suitable for urban and suburban gardens
- Increases biodiversity

Issues starting a mini-meadow

- Buying plants is expensive
- Finding local native plants is not easy
- Germinating from seed is cheap and libraries give native seeds for free, but…

Does not often go well, seed supply is limited, this is where your students can help!

Optimize germination!

Determine what can increase germination of the native mini-meadow candidates:

Cold vernalization

Scarification physical/acid

Find what makes most species germinate fast, NO 60 days of cold.

Learning Objectives

- Apply the scientific method
- Learn experimental design
- Learn to do literature research
- Practice organized data collection
- Treat and present data
- Learn about native flora
- Disseminate findings to the local community, garden groups, libraries, local master gardeners.

How to:

1. Divide the class into groups of 3-4 students.
2. Do in class literature research on meadow species native to the area, what is known about their germination and ecology (invite Library staff to introduce search).
3. Select one or two species per group, make sure there will be blooms throughout the season, see what seeds will be available.
4. Decide what treatment(s) to test based on the literature and ecology of the area. Ex: Acid, cold, H_2O_2 , physical scarification, fire.
5. Plan experiment in the lab, field plot or both. Check seeds weekly after treatment.
6. Analyze and discuss data.
7. Present findings as leaflet to share out of class or as a poster.

Materials and Methods

Six New York native species were selected:

Asclepias incarnata (swamp milkweed)
Asclepias tuberosa (butterfly weed)
Echinacea purpurea (cone flower)
Monarda fistulosa (wild bergamot
Symphyotrichum novae-angliae (New England aster)
Zizia aurea (golden alexander).

Six lab treatments were tested for all six species, 100 seeds of each.

1. vernalized for 30 days,14 days and 7 days at 4.5°C.
2. Treated with HCl 0.01M (pH 2) for 1hour and then rinsed with water.
3. Cold + acid for the 14 and 7 days.

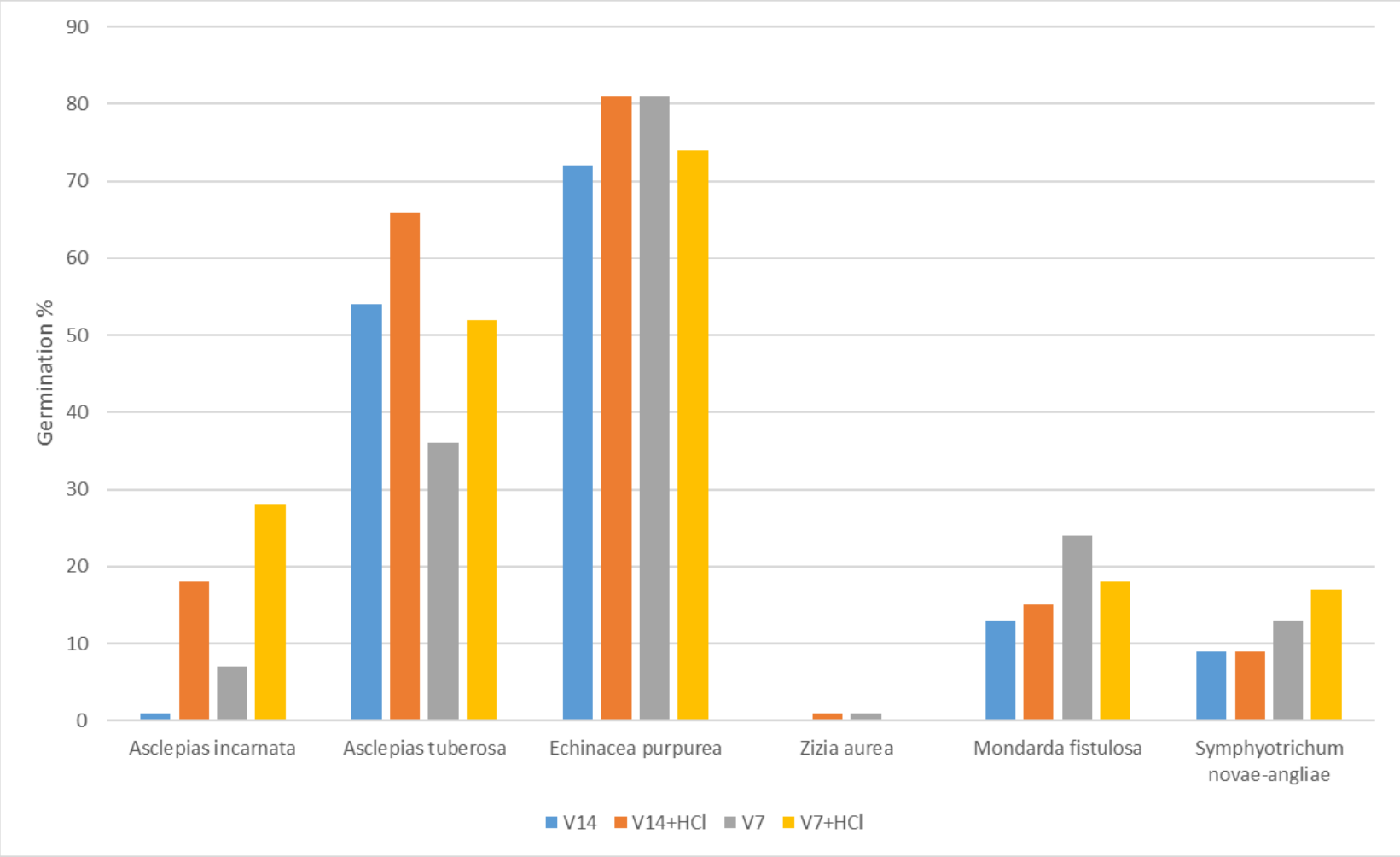
All treatments and controls with no treatments were put to germinate in sealed plastic bags under lights at 25 to 30°C.

Field plot seeds before winter vs in April

Experimental plot at Washington Market Square park, downtown Manhattan (under BMCC). 200 seeds of each species were added in December to subplots 1 and 4 and in April to subplots 2 and 3.

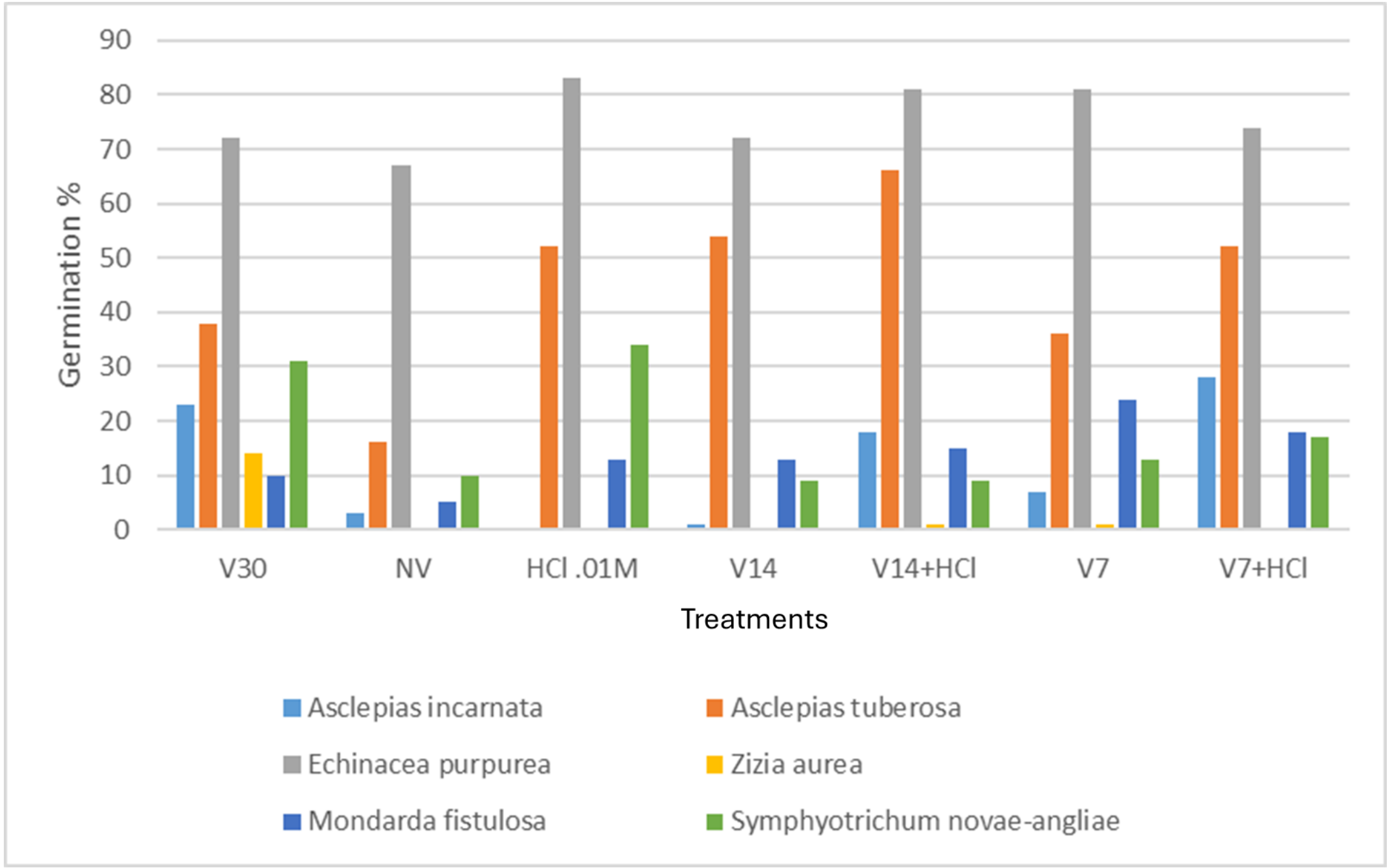
Sadly, there were pests in action.

Results



Percentage of germination with HCl 0.01M acid scarification vs. no acid scarification, with and without 7 and 14 days of moist vernalization at 4.5oC, plus untreated controls. 100 seeds per treatment.

Echinacea purpurea seedlings from control seeds (left) and from acid treated seeds (right). Photos by Tosha.


90
80
70
60
50
40
30
20
10
0
Germination %
V30
NV
HCl .01M
V14
V14+HCl
V7
V7+HCl
Treatments
Asclepias incarnata
Asclepias tuberosa
Echinacea purpurea
Zizia aurea
Mondarda fistulosa
Symphyotrichum novae-angliae

Germination table per species/treatment

new germinated seeds Asclepias incarnata

	1-Feb	7-Feb	14-Feb	21-Feb	27-Feb	total	% germination	
Control								
Acid								
Acid+7d cold								
7 day cold								
14 day cold								
30 day cold								

Note: Germinated seeds are removed and some planted in pots to ID seedlings, photographed weekly

Poster Judge:_____ Grade each item from 1 BAD to 5 VERY GOOD

Poster topic	Authors	The poster is visually appealing	The topic is stated clearly	The data is easy to visualize	I understand why it matters	Poster was well presented	Presenter is knowledge able on the topic	Total